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Report on Diseases of Farm Livestock

SECTION III: PARASITIC DISEASES OF BOVINES

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DISEASES CAUSED BY PROTOZOA

Bovine Coccidiosis

This disease, which sometimes occurs in epidemic form in cattle, is caused by protozoan parasites belonging to the genus *Eimeria*. Little work has been done towards elucidating the species mainly responsible for the disease in Great Britain, but it is probable that *E. zurnii* is the principal pathogenic species and that *E. smithi*, *E. ellipsoidalis* and *E. cylindrica* are also of importance.

Outline of Life-cycle.—Infection is brought about by the ingestion of those oöcysts which have been outside the host body for a sufficiently long time for sporulation to be completed. These infective oöcysts are swallowed with the food or drinking water. Eight sporozoites, derived from the four spores within the sporulated oöcysts, are released into the intestine and penetrate the cells of the epithelium where they grow at the cells' expense into schizonts which later give rise to numerous merozoites. These merozoites are liberated into the lumen of the intestine by the rupture of the host cell. Once the merozoites are in the intestinal lumen they quickly penetrate other epithelial cells and the asexual cycle of development (schizogony) is repeated. This repetition is, however, of limited duration and the schizogonous phase ultimately gives rise to the sexual or sporogenous phase in which the merozoites become differentiated into male and female elements. Oöcysts, the product of the fusion of these elements, are released by the rupture of the invaded cells and are eventually voided with the faeces. A certain period, the length of which depends on environmental factors such as temperature, aeration and moisture, must be passed in the outside world before the oöcysts mature, *i.e.*, attain to the fully sporulated condition and become infective to new hosts. Under optimum environmental conditions this period varies from one to five days, depending on the species.

THE DISEASE

Cattle of all ages are known to be affected but those up to one year are most susceptible to its attack; two to four weeks is a common incubation period but a longer time may be required for the disease to reach epidemic proportions among a group of calves.

Coccidia occur wherever cattle are kept but opinion is divided as to the frequency of coccidiosis as a disease among cattle in Great Britain. Epidemics are more often reported in the southern part of England but it is probable that the disease occurs more frequently in Ireland than on this side of the Irish Sea.

(*a*) *Symptoms.*—The faeces, which frequently contain strings of mucus, are diarrhoeic, often foul-smelling and blood —either liquid or in the form of clots—may be voided with the terminal portion of the faeces. Trismus is frequently seen: the affected animal often stands with arched back in a characteristic posture lasting for several minutes at a time. The passing of bloody urine has also been reported although its origin is not clear. The animal becomes anaemic and weak, and emaciation ensues. The diagnosis of sub-acute cases is more difficult owing to the indefinite nature of the symptoms, and the possible occurrence of a sub-clinical infestation is even more difficult to substantiate owing to the frequent occurrence of coccidial oöcysts in the faeces of healthy animals.

(*b*) *Pathology.*—The gross pathological changes produced by coccidia are associated with the considerable asexual multiplication of the parasites within the linings of the colon, rectum and caecum. These changes are brought about by loss of epithelium, thickening of the mucous membrane and petechial haemorrhages in mild cases and diffuse haemorrhages in acute ones. These haemorrhagic areas are usually situated on the folds of the lining membrane. Catarrhal enteritis may be found in the small intestine but the lesions are sometimes more numerous in the caecum.

(*c*) *Epidemiology.*—Most cattle are infested with coccidia but show no clinical symptoms, the pathogenic action of the parasite only resulting from massive infestation. Oöcysts may be passed in the faeces in such small numbers that ordinary microscopical examination fails to detect their presence; they are frequently found, however, in appreciable numbers even in the faeces of healthy cattle. Adult animals are resistant to the disease "coccidiosis," although they very often harbour the parasite and act as carriers from which the susceptible immature animals become infected. Because of the self-limiting nature of the life cycle resulting from the definite time limit for the vegetative phase of development, which has been described in the account of the life-cycle, mere infection is not sufficient to bring about the disease, for which repeated reinfection is necessary. The circumstances under which the disease most frequently occurs are those of young cattle crowded together and the onset of symptoms is often sudden, although the building-up of infection may have been gradual. Infections become less severe as the epidemic progresses, a result, in all probability, of the development of immunity in the group of affected animals. A certain number of debilitated animals, in which recovery is never quite complete, is usually left after an outbreak.

DIAGNOSIS

Diagnosis of the disease is made from the symptoms, the history of the outbreak and the presence of oöcysts in the faeces. Counts of the oöcysts can be carried out in a manner similar to that used for worm eggs, or they may be concentrated by the salt flotation method, but no reliance can be placed on oöcyst counts as a diagnostic procedure. Comparisons between oöcyst counts in the faeces of suspected cases and seemingly normal animals of the same herd may be instructive. The output of oöcysts varies greatly during the course of the disease, the numbers during the most acute phase sometimes being relatively small, owing to a large proportion of the parasites not having reached the sexual cycle which terminates in oöcyst production.

CONTROL

There is no specific treatment for the disease. Two points should be borne in mind when control measures are being

contemplated: (1) carriers of coccidia are common and (2) the excessive ingestion of oöcysts is particularly harmful to young stock. Young calves should never be introduced into crowded quarters occupied by a group of calves of various ages. As most animals carry coccidia, the quarters occupied by the original group of calves will carry a substantial number of infective oöcysts available for reinfection and ultimately large numbers of oöcysts are being discharged by most of the animals. Calves subsequently introduced are exposed to large numbers of infective oöcysts and the process is repeated until the parasite population is raised to a dangerous level.

It is evident that prevention of reinfection is essential and, where animals are housed, this may be achieved by thorough cleaning out every two days before the oöcysts have time to become infective; or, alternatively, the animals should be tied in stalls so that they cannot take food or water contaminated by faeces. Hygienic precautions together with warmth and the provision of a light diet are sometimes efficacious in controlling an outbreak.

There are indications that some of the sulphonamides may be of value in treatment, but research work is not yet sufficiently advanced to enable recommendations to be made for their use in veterinary practice for the control of bovine coccidiosis.

The disinfection of premises is best carried out with a 10 per cent. watery solution of ammonia which has been found to have a particularly marked lethal effect upon the oöcysts. Manure from diseased cattle should be mixed with horse manure to encourage fermentation with the production of ammonia and other toxic products of decomposition which are destructive to oöcysts. The manure should not be used on cattle pastures.

Specificity of Bovine Coccidia.—Attempts to infect cattle with the oöcysts of non-bovine species of coccidia and *vice versa* have not been successful.

Babesiosis—'Redwater,' Bovine Haemoglobinuria

Babesiosis is not of widespread occurrence in the British Isles, but is very prevalent in certain districts, the chief of which are the south and west of England, Wales, parts of Scotland and Ireland. The name 'redwater' is rather a misnomer as the urine is more often of a dark brown colour and there are conditions other than babesiosis in which the urine actually is red. Babesiosis is principally a disease of adult cattle but is not uncommon in yearlings. The protozoon parasite *Babesia bovis* is generally considered to be the cause, the European strain of *B. bigemina* apparently being absent from this country. *B. bovis* is a pear-shaped organism, usually occurring in twos, situated in the red blood cell close to its margin with their pointed ends approximating whilst their broader extremities are widely divergent. The organisms multiply by binary fission within the red cells which eventually are destroyed; the parasites then invade other red cells and repeat the cycle. This continual breaking down of red cells is responsible for the haemoglobinaemia, haemoglobinuria and jaundice, all of which occur during the course of the disease. The disease is transmitted from one animal to another by ticks, *Ixodes ricinus* and possibly *Haemaphysalis punctata* being responsible in Great Britain. The exact details of the life history of these parasites whilst in the tick are not known, but it is generally understood that some form of sexual phase occurs, resulting in the formation of sporozoites capable of infecting another bovine. Infection of the bovine takes place when the tick feeds on the host.

The female tick can transmit the infection through the egg to the larvae, nymphs and possibly the adults of the next generation, or the disease may be transmitted by nymphs or adults from infection acquired in the preceding stage. As all stages of the ticks are passed on different hosts there is opportunity for a wide dissemination of the disease.

Babesiosis is most commonly seen in spring and autumn, the seasons of maximum tick activity, but it is not wholly confined to these seasons. Symptoms often occur when the animals' resistance to the disease has been reduced by some unusual strain, *e.g.*, parturition or a long rail journey. The disease is confined to areas of tick activity, but cases sometimes occur in tick-free areas in animals which have been transported from a tick-infested area. Cattle indigenous to redwater areas are generally resistant to the disease because they become infected early in life and retain parasites in the blood after recovery. However, this state of premunition does not occur in all animals and the immunity is not absolute. Cattle from redwater-free areas imported into infected areas are susceptible to the disease as they have no premunition.

Acute and mild cases of babesiosis are seen. In the acute cases the animal is found away from the herd and unwilling to move. The coat is staring and the temperature is high (105° to 107° F.). Diarrhoea occurs at first, but obstinate constipation follows. Cardiac palpitations are a feature and may be heard even whilst standing some distance away from the animal. Rumination ceases, the appetite is lost and wasting is general and very rapid. Haemoglobinuria appears about 24 hours after the commencement of the disease, and in a few days death follows in the untreated case. The mild form occurs more particularly in calves and young cattle, and as a relapse in older beasts. In this form of the disease a slight constitutional disturbance is seen for seven to ten days accompanied by marked symptoms of anaemia.

On *post-mortem* examination the blood may be observed to be pale and thin, the liver is large and friable, the spleen is enlarged and sometimes its capsule is ruptured. The bladder is filled with a thick red or black albuminous fluid. Although parasites are present in the blood, they are often difficult to find.

Diagnosis is generally made on clinical grounds only, especially in a known redwater area. Some practitioners in such areas treat for redwater all animals showing a high temperature and inappetence. A positive diagnosis can, however, only be made by examination of a blood film taken at the height of an attack when from 5 to 40 per cent. of the red blood cells may be found to be invaded by the parasites. The film is stained by Leishman's or Giemsa's stain, the latter giving more permanent results.

Specific bovine haematuria, and haematuria in general may be differentiated from babesiosis by the presence of red blood corpuscles in the urine.

Treatment.

A large number of drugs and combinations of drugs have been recommended for the treatment of redwater, but the modern specific treatment is by the use of one of the preparations of dimethylquinolylmethyl sulphate urea which is marketed under the names of 'Acapron,' 'Pirevan,' 'Piroparv,' etc. Acapron and Piroparv are given at the dosage rate of 1 c.c. per cwt. body weight, whilst the total dose of Pirevan is 10 c.c. The drugs are injected into a part—for example the dewlap—from which absorption is slow. Improvement is noticeable in a few hours and in 24 hours early cases are cured. Where cases are not diagnosed in the early stages and where constipation has already set in, these drugs must be administered with caution.

Another drug—4:4' diamidinodiphenylether di-β-hydroxyethane-sulphonate—has recently been introduced for redwater and is sold under the names of 'M. & B. 736'

and 'Phenamidine.' It is administered by subcutaneous injection of the aqueous solution, the dose being three to four grammes of the solid substance. Preliminary trials have indicated that it is very effective for the treatment of babesiosis and no toxic symptoms have been described.

Apart from the use of these drugs, the treatment is symptomatic. Common salt along with copious amounts of water is used to treat the constipation. Treacle is administered for the same reason and also to counteract any tendency to acidosis (ketosis) arising as a result of the wasting. During the convalescent stage, haematinics may be given to hasten the replacement of the destroyed blood cells. Toxic effects have occasionally accompanied the use of dimethylquinolylmethyl sulphate urea, the symptoms shown including restlessness, persistent recumbency and tremors. The analeptic adrenalin has been recommended for the treatment of this sequel. Good nursing is especially valuable and care should be taken to prevent unnecessary movement on the part of the animal.

It is well to bear in mind the phenomenon of the production of drug-resistant strains of parasites by inadequate dosing and if the specific drugs are to be used at all in this disease the full therapeutic dose should be employed.

It should be noted that animals which have recovered from redwater remain carriers for life and are reservoirs of infection from which other animals may be infected through the medium of ticks.

Two principles are involved in prophylaxis and control of the disease. Firstly, the immunisation of animals and, secondly, the prevention of infection by the eradication of ticks. Recovered animals carrying organisms in the blood are in a state of premunition and are not susceptible to redwater. For this reason, protective inoculation is carried out by the injection of blood from an animal which has recovered from babesiosis a month or so previously. A mild attack of the condition is then set up from which recovery is rapid and the animal rendered resistant. Young animals respond best to this treatment. After the injection the animal's temperature should be taken daily and, if it rises, treatment should be applied using one of the specific drugs already mentioned. The method has never found favour in this country and has not been very widely used.

The eradication of ticks will control babesiosis by removing the essential vector. The problem is, however, considered in a separate section of this review.

DISEASES CAUSED BY ARTHROPODS

Pediculosis

Four species of lice affect cattle in Great Britain. Three of these species are sucking lice and the fourth is a biting louse; they are:—

Haematopinus eurysternus	Sucking lice.
Linognathus vituli	
Solenopotes capillatus	
Bovicola bovis	Biting louse.

Both types of lice are permanent parasites living continuously in all their stages on cattle and are seldom able to live for more than a few days if removed from their hosts. The sucking lice are of more importance than the biting louse. The former possess mouth-parts highly modified for piercing the skin and drawing blood which constitutes their only food; the latter feeds on hair, loose scales and other debris on the skin of the host.

Life History

The broad outline of the life cycle of each louse is known and that of *Haematopinus eurysternus* has recently been worked out in some detail. The eggs of all four species are attached very firmly by a glutinous substance to the hairs near to the skin, three, four or even more being laid on a single hair. The incubation period for the eggs varies with the species and is for *Haematopinus eurysternus* 9 to 19 days, average 12 days; for *Linognathus vituli* and *Solenopotes capillatus* 10 to 13 days; and for the biting louse, *Bovicola bovis*, 7 to 10 days, average 8 days. The incubation period varies with the air temperature, being shorter at higher temperatures; the threshold for the development of the eggs of *Haematopinus eurysternus* is about 27·5° C. Eggs of *Haematopinus eurysternus* are laid at the rate of one to four a day, a total of about 24 being deposited by each female. After hatching from the egg the larva feeds and grows and moults three times, the average length of each stage of development being four days. After the third moult, the change to the adult form takes place and pairing follows within a very short period. The average length of the pre-oviposition period is four days, so that the complete life cycle, from egg to egg, is of 28 days' duration.

The maximum length of life of the male on the host is about 10 days and that of the female about 16 days. When removed from the host and kept at 20° C. at a relative humidity of 70 per cent. saturation, adults of this louse do not survive for more than 72 hours. Some nymphs may survive this period, but none survive for more than 96 hours.

Although the biting louse does not suck blood, it is a fairly active insect and moves about considerably more than do the sucking lice and this constant movement may cause great irritation to the host. *Bovicola bovis* appears to be the most common and most widely distributed species of louse on cattle in Great Britain. Although it may sometimes occur generally over the body, it usually congregates in groups round the base of the tail and on the withers and neck; the intense irritation it produces causes infested cattle to rub the hair off the affected parts, and lesions resembling scab or ringworm often result.

The sucking lice are more sluggish parasites and also cause a certain degree of irritation which produces scratching, rubbing and loss of condition. They do not engorge themselves with one meal but feed at frequent intervals. *Haematopinus eurysternus* and *Linognathus vituli* mainly infest the shoulders and upper portion of the neck, head and throat, and the tail—especially towards the base; whereas *Solenopotes capillatus* has a tendency to attach itself in dense groups about the head and neck of the host.

Distribution

Lice are widespread in their distribution in Great Britain and, in a recent survey, 84·5 per cent. of 309 farmers reported that their cattle were subject to lice infestation and 74·5 per cent. of these farmers stated that they considered lice to be harmful. The regional distribution of lice in Great Britain is not uniform. Cattle in the east of England and of Scotland are very lightly affected, whereas cattle in southern Argyll, the Pennine Chain area, Wales, Monmouthshire and the western and midland plains of England are more severely affected.

There is also a marked seasonal variation in the density of the lice population. The maximum density is reached in February and March; in April and May there is a rapid decline until the lowest level is reached in June, July and August. In September the lice start increasing in numbers till they reach their maximum density again in February and March. It will be observed that the greatest lice populations occur in the periods when the plane of nutrition is lowest. Steps should be taken to ensure adequate nutrition; vitamins in particular should be adequately provided as it has been shown that lack of vitamin A results in increased susceptibility

to lice. This vitamin, however, is not the sole factor and care should be taken that the diet does not lack any of the known essential constituents. Exactly how diet influences susceptibility to lice infestation is not known, but it is known that diet influences the condition of the coat and skin.

Lice do not often voluntarily leave the host but they may spread rapidly from one animal to another and infestation is mainly through close contact of hosts. The symptoms shown by infested animals are those of considerable pruritus and there is constant rubbing and scratching. Desquamation of the epithelium takes place giving rise to much scurf. Coincidental with lice infestation there is a considerable loss of condition, frequently regarded as a result of lousiness although it would doubtless be nearer the truth to regard the lice infestation as being complementary to the poor condition.

Diagnosis of the condition is made by finding the lice on the animal. In searching for lice on lightly affected animals, particular attention should be paid to the head region, along the spine, and the axilla, and the inner aspect of the thigh.

Control

In controlling lice, steps should be taken to improve the general condition of the animal by adequate nutrition in addition to the application of dressings. Derris root is one of the most effective agents for this purpose, and a good lotion is that prepared by adding one ounce of the powdered root to a gallon of water. Owing to the scarcity of derris at the present time, other agents have to be employed, nicotine sulphate (one and a half drams of 40 per cent. solution to a gallon of water) being as effective as any. Great care should, however, be taken in its use as poisoning sometimes occurs from absorption of the drug. As the eggs are not destroyed by the first application of a dressing, it must be repeated in 12 to 14 days as this gives time for most of the eggs to hatch, but does not give time for the earliest-hatched larvae to reach the adult stage and lay more eggs. Two dressings should therefore completely rid an animal of lice, but it is advisable to give a third dressing. A convenient method of applying the dressings would be by dipping and this method is employed in America. In Britain, dipping plants are rarely to be found so that spraying must be employed and this method is quite effective. Spraying or dipping is best carried out in autumn when the lice infestation is at its lowest level and just before the beginning of the seasonal increase in the lice population. As the lice survive up to four days away from the host, animals after treatment for lice should be placed in clean surroundings with new bedding and all grooming tools should be cleaned before being used on the treated animal.

The Ox Warble Flies

Two species of warble flies, namely, *Hypoderma bovis* and *Hypoderma lineatum*, affect cattle in Great Britain. The adult insects are fairly large, dark, hairy flies with bands of yellow or orange which give them a superficial resemblance to humblebees. *H. bovis* is a little over half an inch in length and *H. lineatum* is slightly smaller. Both flies have very much reduced mouth-parts so that they can neither feed nor bite. The females of both species possess an ovipositor, consisting of the hind segments of the abdomen telescoped into one another, which is adapted for laying eggs but is quite incapable of piercing or stinging. It is difficult to understand why these flies which cannot bite or sting produce such terror in cattle and make them stampede unless it is due to the hum of the fly or persistent attempts by the females to lay their eggs on the animal's hairs.

Life Histories.—The life histories and habits of the two species have many points in common, although our knowledge of *H. lineatum* is greater than that of *H. bovis*. In both, the life-cycle takes about a year to complete, the greater part of the time being spent as a larva in the tissues of the host animal. Both flies, but particularly *H. bovis*, prefer warm sunny weather; they dislike rain and high wind; they also dislike shade so that a shed is a good protection. The flies will not follow cattle into and over water. Neither species is long-lived—probably about a week—as would be expected since they are incapable of feeding.

Hypoderma lineatum adults emerge from their pupal case from early June to about mid-July. After pairing, the fertilised female begins to lay her eggs which may be deposited on several sites such as the sides and undersides of the abdomen, the legs and the region of the rump. The insects appear to prefer laying eggs on the shaded parts of the body, chiefly on the legs. A favourite place, in the case of *H. lineatum*, is the region of the heel and this preference has earned for this insect in North America the common name of 'the heel fly.' The females approach cattle most actively on bright sunshiny days to oviposit; they are usually very quiet in their attack and are not so liable to cause stampeding as the less stealthy *H. bovis*. *H. lineatum* lays her eggs in rows of six or more up to about 14 to each hair and from 400 to 800 eggs may be laid by a single female.

About a week after laying, the eggs hatch and the minute white larvae, only about one-thirtieth of an inch long, escape. They crawl down the hair to the skin and either penetrate it through tiny injuries made, for example, by other biting flies, or bore through the skin into the underlying tissue. This process is completed by the end of August when larvae from the latest eggs have hatched and penetrated the skin. During September, October and November the larvae wander in the subcutaneous connective tissues of the leg, chest and abdomen, and in time reach the wall of the gullet. From December to about mid-February—sometimes earlier and sometimes later—larvae may be found in the oesophageal wall where they reach a length of about half an inch. From mid-February to mid-March the larvae migrate to and reach the back. The exact route from the oesophagus to the back is difficult to define, but one larval track has actually been observed from the oesophagus, along the fibres of the diaphragm, along the posterior border of the rib and into the spinal canal *via* the posterior foramen, although an alternative shorter route through the pillars of the diaphragm also seems probable. Having reached the back, each larva bores an opening through the skin. The host's tissues react to the presence of the larva and form a tumour-like cyst or 'warble' around each one. It is in this chamber that the larva completes its development, lying vertically under the skin with its hind end—possessing two respiratory spiracles—towards the hole in the skin. It feeds on the inflammatory exudate within the 'warble.' The length of time taken for the development of the larva in the back is about ten weeks and during this time it is most vulnerable and can best be dealt with by the control measures outlined later. During the latter half of March, the earliest larvae mature and emerge from the back, while during April there is a succession of mature larvae falling to the ground where they pupate. In May and early June the latest larvae mature and leave the host. After a short quiescent period (under cover of litter) the larva moults, retaining around itself the cast skin which turns hard and black and forms the puparium under cover of which the metamorphosis into the fly occurs. The length of the pupal period varies with the weather, but the average is about six weeks and the fly emerges during June and July.

Hypoderma bovis appears on the wing later in the summer than *H. lineatum* and while the latter fly may in favourable years be seen in May, the former does not appear until about a month or so later. This time difference between the two

species persists throughout their respective life cycles. While, therefore, *H. lineatum* larvae become mature from mid-March onwards, those of *H. bovis* do not begin to mature until April. This fact determines the minimum period for the dressing of 'warbled' cattle.

Unlike *H. lineatum*, the females of *H. bovis* lay their eggs singly on a hair and not in rows. This results in a more frequent attack so that *H. bovis* worries cattle more than does *H. lineatum*. Although less is known about the migration of *H. bovis* in the host, it appears that the wandering larvae do not select the oesophageal region as a resting place before they pass to the back. As the result of recent observations there is evidence to suggest that *H. bovis* larvae normally penetrate the skin and travel by way of the nerve trunks to reach the epidural tissue and from there to the skin of the back.

The life cycle of *Hypoderma lineatum* may conveniently be summarised as follows:—

Table of Life Cycle of *Hypoderma lineatum*

June ...	Adult flies emerge, pair and the female oviposits.
July ...	
August ...	Eggs hatch and the tiny larvae cut directly into the skin giving rise to sensitive areas that show for a short time as small pimples and scabs.
September	Larvae continue their boring and migrate through the tissues to chest and abdominal muscles.
October...	
November	
December	Larvae found in walls of gullet and later move towards the back.
January...	
February	
March ...	Larvae reach back, make holes through skin. Swellings small at first but increase in size. Larvae stationary in warbles or cysts.
	Earliest larvae mature and emerge.
April ...	A succession of mature larvae emerging.
May ...	Latest larvae maturing. The full-grown larvae now pupate under cover of pupurium in soil.

The flies occur in countries of the northern hemisphere: *H. bovis* is recorded as being the prevalent form in Europe while *H. lineatum* occurs more commonly in Canada and the United States of America. Both species are fairly widely distributed through the British Isles, although they are almost completely absent from the Orkneys, the Shetlands and Caithness. They appear to be more prevalent in the west of England and some other areas where cattle-raising is much practised.

Economic Importance

That these parasites are highly injurious to cattle and cause considerable loss to farmers, butchers and tanners is generally conceded. Injury is produced in a number of ways. Ovipositing flies produce much excitement in stock which may result in considerable diminution in milk yield, failure to put on flesh normally, and injury due to the efforts of the animals to evade attack. As the larvae increase in size and when they are numerous, their migration through the body may influence the productivity and health of the animal. Cases are on record where heavy infestations of the oesophagus produced oedematous conditions and marked irritation. Abundant testimony is at hand as to the injurious effect of the last-stage larvae under the skin of the back; they produce swellings which are evidently painful. Not infrequently, large and painful abscesses are formed under the skin. Badly warbled hides lose much of their value to tanners as leather from a warbled hide is pitted with holes. Many hide and leather merchants consider that grubby hides, even when completely healed, are undesirable on account of the pitted appearance and weaker fibre.

The following information is extracted from evidence submitted by the Hides and Allied Trades Improvement Society:—

"In connection with slaughtered hides (as distinct from casualties) there are six grades, *i.e.*, first, second and third class clears, and first, second and third warbled. There is a difference of nearly 1d. per lb. between a clear and a warbled hide in each grade. There are various technical factors which have a bearing on the grading, even with a warbled hide, but up to eight warbled holes are allowed in a first, between nine and 25 in a second, and 26 or more in a third. The holes were counted on approximately 2,000 hides from all over the country, spread over a period of two or three months, and it was found that there was an average of about five holes per hide in a first, 16 holes per hide in a second and 36 per hide in a third. For the whole of 1943, it was found that out of every 7 ox hides, three of them were warbled, *i.e.*, 43 per cent. of the total: with cows it was one out of every four (approximately 24 per cent.). With ox hides the second and third warbled classes considerably exceeded the firsts; with cows they were about equal. Ox hides are of a higher value than cow hides. The southern and south-western counties seem to return a higher percentage of warbled hides than the northern districts. The incidence of damage varies throughout the year: generally speaking, December shows the lowest average—somewhere about five per cent. of animals slaughtered in that month having warble-damaged hides. It jumps up to 20 per cent. in January, and in April, May, June and July it is not unusual to find that more than seven out of ten (over 70 per cent.) of the hides are warbled. Thereafter the damage lessens each month. This cycle is almost identical every year, although a severe winter may retard by a few weeks the onset of the heavy damage. Taking the year round, more than one hide in every three (35 per cent.) is damaged by warbles.

The spread of the holes over a hide varies considerably. Mostly they are in the middle of the back which is the thickest and most valuable part of the hide. In one hide there might be 12 holes in a space of about the size of one boot sole; in another hide there might be eight holes spread over an area sufficient to ruin five or six soles. As it is only possible to work on averages, a number of pairs of warbled bends containing 3, 16 and 35 warble holes per pair were submitted to what is termed a 'sole cutter,' *i.e.*, an expert whose job it is to cut leather from each bend into soles of various sizes and to do so with the minimum of wastage. The number of soles lost on the bends submitted was estimated: the average result was applied to the total number of warbled hides from cattle slaughtered during 1942, and it was found that approximately ten million soles were lost. Very many of the cow hides are split into two, the resulting leather being used for upholstery for cars, aeroplanes, tanks, etc.; also for travelling cases and so on. When a warbled hide is split, the damaged area is immediately doubled. Pre-war it was possible to estimate to some extent the financial loss and this was calculated at £750,000 per annum."

There are other losses such as that suffered by butchers when a warbled beast is slaughtered due to wastage of meat as a result of the condition known as 'ticked beef.' Where the larvae have migrated in the tissues they leave greenish-yellow tracks containing a jelly-like material (commonly called 'butchers' jelly') and in badly infested animals much trimming is necessary in the affected area in the back of the carcase. Such trimming often results in the wastage of as much as two pounds or more of meat in the location of some of the most valuable cuts.

It will be seen from the above that at the present time the losses caused by the warble fly affect jointly the Ministries of Agriculture, Food and Supply.

Calves and younger cattle are attacked more frequently and more severely than older beasts which appear to have a resistance, possibly on account of their tougher hides. Animals of various classes are equally attacked, no preference being shown for light-coloured beasts. No breed escapes attention from the pest, not even Highland cattle which have been said,

wrongly, to have a hide and underlying muscle too thick for the larvae to penetrate, though hides from the far north of Scotland, the Orkneys and the Shetlands are free from warbles to the extent of about 99 per cent. It has not yet been definitely ascertained whether a degree of immunity or resistance is developed in cattle although it is a fact that certain animals seem to escape the attentions of the fly even though other animals in the same herd become warbled. It has also been noted that the same animals remain free in successive years even when their neighbours are affected.

Control

Because of the severe losses due to warble fly infestation, control of the pest is of great importance and the solution of the problem assumes national importance.

There are two stages of the life cycle when the parasite can be attacked, namely the egg stage and the stage when the larvae are in the animal's back and have cut through the skin. Various attempts have been made to evolve suitable substances which would either act as deterrents against ovipositing flies or as lethal agents against the eggs once they had been laid, but no wholly effective materials have yet been discovered. Repellent dressings so far have proved of little practical value. Control at present therefore depends upon destroying the maturing larvae before they emerge from the skin of the back. Unfortunately these measures must necessarily be applied after the skin has become damaged, but if they are carried out thoroughly and systematically large numbers of warbles are destroyed. A policy of eradication rather than of treatment should be aimed at; by persistent attacks on the parasite, during the larval stage in the back, this pest could be reduced in a few years to insignificant proportions. In fact the complete eradication of warble flies, at least from restricted areas, is not merely a theoretical possibility but has actually been demonstrated, since absolute freedom from the pest was obtained in Clare Island, Ireland, after five years of systematic control work.

The cruising range of the flies is limited to about 400 yards and benefit may be derived from its application even on isolated farms. Full benefit, however, can only be derived where concerted action is taken and this is preferably done on a nation-wide scale.

The destruction of the warble by dressings or by extraction must begin as soon as the first maturing larvae appear under the skin and can be reached, *i.e.*, about mid-March. Treatment must continue at regular intervals until the latest larvae have matured. In the case of *H. lineatum* this will be up to the end of May but as *H. bovis* is a later fly and its larvae continue to appear in June, treatment requires to be carried out against this species until the end of June. Where dressings are being applied the general consensus of opinion is that the interval between them should be from 28 to 35 days, with an average of about one month, so that all larvae will be killed before they are sufficiently mature to leave the host. Numerous experiments with different insecticides have shown that the most effective dressing for warbles is a solution of derris or of its active principle—rotenone.

Great interest has been shown in various parts of the world in the matter of warble fly control and in Great Britain efforts were made to introduce legislation to bring about the systematic destruction of maggots. In 1936, the Minister of Agriculture made an Order designed to control the pest by making the treatment of warbled cattle compulsory. This Order required that all visibly infested cattle should be dressed; treatment should start each year between March 15th and 22nd or as soon after as the larvae appeared under the skin of the backs of the cattle, and repeated at intervals of not less than 27 days and not more than 32 days as long as larvae continued to appear but not after June 30th. The dressing specified under the Order was one which had to be prepared immediately before use by diluting with water a preparation, in powder form, containing powdered derris root. The directions for the dilution of the preparation were such that each gallon of dressing produced contained:—

(*a*) either one and a half ounces of derris resins or one-half of an ounce of rotenone; and also

(*b*) four ounces of soap which might be added at the time of dilution or incorporated in the preparation in powder form.

The dressing had to be applied to the skin in such a manner that it penetrated through the hole made by the larvae into the cavity containing it. Alternatively, mature larvae might be squeezed out or removed by other mechanical means from the backs of infested cattle and effectively destroyed. This procedure was required to be repeated at such intervals, not exceeding ten days, as might be necessary to prevent the escape of live larvae during the period March 15th to June 30th in each year.

An Amending Order made in 1942, removed the option of mechanical removal of maggots and thus the derris dressing was the only, and compulsory, dressing for warbles. Owing to conditions imposed by the war, supplies of derris became restricted with the result that the Order has been suspended.

It will, however, not be out of place here to comment on the use of derris treatment and also on the methods used for the mechanical removal of warbles. Since some samples of derris have been found to contain no rotenone and to be quite innocuous to the warble, the solution to be used should be freshly prepared from a standardised derris product. The solution may be applied by a stout metal syringe with a comparatively blunt wide nozzle, by a cloth or by a power spray. The syringe method makes for greater accuracy but the cloth method is simple and more generally preferred; power sprays are not in common use in this country. In applying the dressing by the second method, the cloth is dipped into the solution and pressed firmly on the skin over the hole in such a manner as to ensure the removal of any exudate or scab over the hole that might prevent entry of the dressing into the warble cyst. Dressing should not be carried out previous to turning out the animals in heavy rain as it has been found that this greatly reduces the number of warbles destroyed.

As a substitute for the derris dressing a nicotine sulphate-lime mixture may be used. It is prepared by adding one gallon of water to one pound hydrated lime, stirring during the addition to prevent the formation of lumps. The dressing is completed by adding two fluid ounces of nicotine sulphate (containing 40 per cent. nicotine) to the lime solution. The mixture must be prepared and used fresh and is applied by a cloth in the same way as the derris dressing; the application should be repeated every four weeks and the interval between dressings should never be longer than 32 days. Fatal poisoning has not infrequently followed the too lavish application of this mixture and care must be taken that the dressing is applied only over the warble holes, general washing of the backs of the cattle with the mixture being avoided. Nor should the hands of those who apply the dressing be continuously wetted with the nicotine solution. This economy of use, with due regard to efficient treatment, will prevent surplus liquid being left on the animal's back whence it may be absorbed to cause toxic effects or be licked off and cause nicotine poisoning.

Another substance which has been used is iodine as a 2½ per cent. tincture, a few drops of which were placed in the warble hole. It was found to be effective in killing the larvae. Ointments of different kinds have been used with varying degrees

CLINICAL COMMUNICATIONS

Some Atypical Cases of Acetonaemia in the Bovine*

F. A. CROWHURST, M.R.C.V.S.
MAIDSTONE

I have selected this particular disease or condition as it is one that is occurring much more frequently during the last few years. First, I wish to select a few cases that have been most interesting to me on account of their not being easily recognised as acetonaemia at all.

Case 1—*Crossbred Guernsey Cow, third Calver.*—This cow had been calved two months; was a heavy milker, but had during the last week considerably dropped in her milk and appetite. Examination revealed no obvious abnormality; she was still cudding, and bowels were normal. The breath and milk revealed no smell consistent with acetonaemia. A sample of urine was collected 24 hours later, and upon examination found to be strongly positive for acetone.

Case 2—*Pedigree Guernsey Cow, calved one month, third Calver.*—Heavy milker that suddenly dropped in milk; ceased to eat at all except roots; was rapidly losing condition. Examination revealed no smell in breath or milk: the animal appeared to be very dull and apathetic; faeces were normal in appearance, though passed in small quantities. Urine analysis was strongly positive for acetone.

Case 3—*Pedigree Friesian Heifer, first Calver.*—Had calved ten weeks previous to my visit. Had gone very thin indeed. Examination revealed no serious abnormality; tuberculosis was discounted; faeces examination was negative for Johne's disease or worm infestation. The heifer was eating very little, and then only roots or greenstuff. The faeces were normal in appearance. Twitching of the muscles of both fore legs was noticed. Urine analysis was positive for acetone.

Case 4—*Crossbred Guernsey Heifer, first Calver.*—Had been calved four days. The animal was taken suddenly ill after milking in the evening. She went down and appeared very drowsy, and exhibited all the familiar symptoms of typical milk fever. Calcium therapy twice in 24 hours brought about no improvement at all, in fact she became worse. No abnormal smell was noticed in the breath, but the characteristic sweet odour was detected in the milk, which, together with the urine, proved strongly positive for acetone.

I have purposely said nothing about treatment of any of these cases, because in each it was the same, and proved very effective indeed, even in the chronic case of the emaciated Friesian heifer, and therefore giving some verification of the diagnosis, which had rested entirely on analysis of the urine for acetone.

In all the quoted cases Rothera's test for ketone bodies has been employed. This can be carried out either in the urine, blood or milk. Some workers maintain that cow's urine is often positive for acetone when they are normal, but I have not found this so, and have had many samples examined and returned as negative.

* Presented to the meeting of the South-Eastern Division, N.V.M.A., held at Tonbridge, November 16th, 1944.

Udall states that acetone occurs in the urine in cases of pneumonia, traumatic pericarditis and gastritis.

Prompt benefit results from the administration of glucose in every case. As recommended by Udall, 500 c.c. of a 40 per cent. solution are given daily or every other day according to the acuteness of the attack, and from one to five doses are generally required for complete recovery. The solution according to Udall is made up as follows:—

Benzoic Acid—2 grammes or 30 grains.
Dextrose—400 grammes or 12½ oz.
D. Water—1,000 c.c. or 1¾ pts.

The amount of glucose given in each dose will be seen to be large, as it is over 6 oz. I usually give the entire dose intravenously, but it is as well to give it very slowly if this method is chosen. It can, however, be given subcutaneously, with equal effect, but it causes pain for some hours and a lump is left which may take several days to disperse completely.

Additional methods of treatment which have been tried include chloral hydrate—sodium bicarb. in large doses; insulin by injection, vitamin B, by injection (thiamin hydrochloride 0·5 gramme intravenously); but I do not think cases recover any more rapidly than with glucose alone.

I have put these particular cases before you, as they are in my view decidedly atypical of acetonaemia on account of the absence of "smell" in the breath and in which the diagnosis has entirely depended upon the finding of ketone bodies in the urine.

DISCUSSION

Mr. BRUFORD enquired whether Mr. Crowhurst had tried Loeffler's test on the milk, as it was not only diagnostic but gave a fair idea as to how long the condition had been in existence and what the response to glucose was likely to be. In his experience the first warning of the condition was a drop in the milk yield, and cases often occurred up to six weeks after calving. He used glucose and vitamin B with good effect. He could not agree that Mr. Crowhurst's cases were atypical, as only rarely could he distinguish what was called the characteristic smell in the breath.

Mr. PATERSON said he had seen several cases where ketone bodies had been found in the urine, and which he thought were cases of acetonaemia, but in each case blood examination was negative. The explanation given to him was that ketone bodies were often found in normal urine to a small extent, and a quantitative test was necessary as well as a qualitative one.

Dr. MONTGOMERY asked Mr. Bruford's method of treatment, and what type of vitamin B he used. Mr. BRUFORD replied that he was sent small supplies for trial from Weybridge, and no name was given. He had only seen the condition in stabled animals during the winter.

Major OXSPRING asked Mr. Crowhurst whether he had used insulin, and, if so, with what result. Mr. CROWHURST replied that he had only used it in conjunction with glucose, and did not think it had much effect.

Mr. MCCONNACHIE INGRAM doubted the existence of acetonaemia as a distinct pathological condition. He had often noticed what was described as the typical smell in the breath of cows suffering from milk fever, and also in cases of traumatic pericarditis, and in cows which lost condition while in milk as they would not eat concentrated food, but only hay. He said the condition had been described as "post-parturient dyspepsia" by Begg, who stated that cases responded to large doses of formalin.

Reference.—UDALL, The Practice of Veterinary Medicine, Fourth Edition.

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Bovine Pasteurellosis

An Unusual Type of so-called Haemorrhagic Septicaemia

P. E. MULLANEY, M.R.C.V.S.
VETERINARY COLLEGE, DUBLIN

The brief and somewhat unsatisfactory history of this outbreak as given by telephonic communication was as follows:—

A "number" of Jersey calves, about four months old, were suffering from severe diarrhoea and "several" had already died after an illness which lasted only a few days. They were all housed in a large shed under rather unhygienic conditions. The veterinary surgeon suspected parasitic gastro-enteritis as a possible cause of the mortality and forwarded a recently dead calf for examination.

Post-mortem Examination.—The carcase was emaciated. There was a bloody nasal discharge and a whitish faecal discharge from the anus. The right lung showed patchy consolidation while the major portion of the left lung sank in water. There was a serofibrinous pericarditis and petechial haemorrhages were present in the epicardium and endocardium. The gastric m.m. was normal. A catarrhal inflammation affected the m.m. of the small intestine. The relative nymph nodes were swollen. The liver was pale and friable and the spleen slightly swollen. The kidneys were somewhat pale in colour. Examination of the intestinal contents negatived gross parasitism.

From the lungs and mesenteric lymph nodes pure cultures were raised on liver agar. The growth after 24 hours at 37° C. was delicate and bluish in colour, composed of small translucent colonies. Smears revealed gram negative, pleomorphic, bipolar-staining rods. The latter feature was more apparent with the Leishman stain.

Pathogenicity.—A rabbit inoculated subcutaneously with 1 c.c. of a broth culture died of a septicaemia in 12 hours. Apart from the presence of swarming pasteurella-like organisms in the blood stream, the only lesion present was an intense haemorrhagic

(*Concluded at foot of col.* 1., *page* 80.)

of success and one consisting of one part iodoform and five parts vaseline has given fairly satisfactory results.

Mechanical removal by squeezing out the warbles by hand may be attempted. Usually pressure by the thumb and forefinger of both hands to the swelling is necessary. To overcome some of the difficulties of hand pressure, particularly in animals with thick skins, mechanical devices have been used.

It has been suggested that when warble fly larvae, during mechanical extraction, are broken *in situ*, the contents of the larvae have a toxic effect on the host. Doubt is, however, cast on this theory by experiments carried out in this country in which no ill-effects resulted when warble larvae were deliberately broken in the backs of cattle. Nevertheless, other observers have recorded more alarming symptoms which appear to be in the nature of anaphylactic reactions, such as pronounced salivation, laboured breathing, profuse lachrymation, general distress, weakness and exhaustion, etc., following the injection of warble larvae extract into animals sensitised by natural infestations. These observers draw attention to the danger of what they call anaphylactic shock in cattle if maggots are crushed in the back during extraction.

(To be concluded.)

ABSTRACTS

[A Consideration of some of the Factors Concerned in Intracutaneous Injection of Cattle. Henderson, W. M. (1944.) *J. Path. and Bact.* **56.** 315-325.]

Experimental evidence has shown that the choice of the intracutaneous route for the injection of immunising agents may produce better results than those obtained after injection by other routes. The principal limitation of the use of this route in large animals is that considerable pressure is required if more than a small dose is to be injected. This paper describes experiments which determined the volume that could be injected intracutaneously at one site, the pressure required and the rate of absorption of the inoculum.

With an ordinary hypodermic syringe it was possible to inject 5 c.c. into the skin of the neck of cattle; by the use of a special syringe designed for the purpose up to 10 c.c. could be readily injected at one site. The pressure required for the injection of 5 c.c. of distilled water into the skin of the neck varied from 17 to 30 lb. per square inch, less pressure being required for the thinner skin of the caudal fold. The pressure had to be increased for the injection of more viscous liquids. An intracutaneous injection was found to be almost entirely intralymphatic, the inoculum being drained very rapidly from the site of injection to the regional lymph gland. Devon steers were injected intracutaneously about 8 inches from the point of the shoulder in the mid-line of the side of the neck; slaughter of the animals and removal of the prescapular lymph gland revealed that, with a 0·5 c.c. injection, the inoculum could be regularly detected in the gland after about 60 seconds from the time of commencement of the injection. With 5 c.c. of physiological saline solution absorption appeared to be complete in about 45 minutes. Absorption by the lymphatics following subcutaneous injection was found to be very much slower.

This rapid involvement of the lymphatic tissue following intracutaneous injection is discussed in connection with the more favourable results that have been reported when this route was used for vaccination.

W. M. H.

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[Effects of Environment upon the Free-living Stages of *Ostertagia circumcincta*. Stadelmann. (1944.) *Amer. J. vet. Res.* **5.** 147.]

Working in California the author found that the free-living stage of *Ostertagia circumcincta* can develop in large numbers during the summer on irrigated pastures and that infective larvae on such pastures can survive throughout the whole summer season. But on land that is not irrigated all the free-living stages are rapidly killed in the summer. The conclusion is drawn that irrigated pastures which are left idle through the summer must still be considered potential foci of infestation.

Studying the influence of the nature of the plants in the pastures, the author found that irrigated Ladino clover (*Trifolium repens* var. *latum*) is more favourable to the development and survival of the free-living stages in the summer than irrigated alfalfa (*Medicago sativa*) or Western ye grass (*Lolium multiflorum*). More infective larvae were found on the upper foliage of Ladino clover than on the alfalfa or rye grass. The Ladino clover has a glabrous stem lying prostrate on the soil and the petiolules of leaflets arise as smooth "branches," which offer no resistance to the migration of the larvae. Alfalfa has raised obstructions at the junctions of the side stems with the main stem. Western rye grass has a glabrous stem (culm) enveloped in the sheath of each leaf and this may divert the migrating larvae on to the leaf. [The author does not refer to the similar work of E. L. Taylor (*Vet. Rec.* (1938). **50.** 1265 and *Ibid.* (1939.) **51.** 495, nor to the extensive literature on the bionomics of strongyloid larvae.] The author found that during the autumn and winter months a much greater number of eggs developed to the infective larval stage than in the summer and he attributes the increased incidence of *O. circumcincta* in California during the autumn and winter months to the increase in the numbers and availability of infective larvae at these periods. For the same reason a higher incidence is to be expected in the summer on irrigated rather than on non-irrigated pastures. Irrigated heavy soil is more favourable to the longevity of the larvae in the summer than light irrigated soil. For details of the methods used and the effects of shaded and non-shaded conditions, the paper itself must be consulted. The field experiments described in this paper are directly correlated with a previous paper (*Amer. J. vet. Res.* (1944.) **5.** 79) in which the author recorded his laboratory experiments on the relative susceptibility of eggs and pre-infective larvae to extremes of temperature and to desiccation and on the relatively great resistance of infective larvae of this species to these.

G. L.

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[Symptoms Caused by Experimentally Produced Lesions in the Cerebrum of Dogs. Essex, H. E., Schlotthauer, C. F., and Haddow, M. K. (1944.) *Amer. J. vet. Res.* **5.** 274.]

Sterile lesions were produced experimentally in the cerebral hemispheres of dogs by surgically exposing the dura mater and placing a piece of carbon dioxide snow on it for two minutes. Twenty dogs were treated in the first experiment, lesions being made in the left hemisphere at or near the motor area; eight animals showed nervous symptoms, and two of these died from cerebral haemorrhage. The transient nervous symptoms developed within 40 minutes to 7½ hours of the operation, and no nervous symptoms were noted after the first post-operative day. The affected animals showed convulsions and epileptiform fits, characterised by twitching of the muscles of the face, champing of the jaws, and clonic jerking of the legs, while one dog showed a tendency to run and bark during the recovery period. Lesions were made in the right cerebral hemispheres of the 18 dogs that survived the first operation, and 15 of these showed symptoms, restricted to the first post-operative day as before, but possibly more severe than in the first instances. The brain lesions healed rapidly by scar tissue formation.

These experiments showed that dogs may be only transiently or not at all affected when fairly large lesions are produced in their cerebral hemispheres, and this experimental finding may have a bearing on the prognosis to be given in cases where dogs receive accidental cerebral injuries, as in car accidents, falls and so on.

E. C.

REPORT

[Department of Agriculture, Canada. Report of the Veterinary Director General for Year ended March, 1944.]

"Canada has been fortunate in that during the past year no serious outbreak of contagious disease in livestock has occurred. In general the health of farm livestock has been good. Conditions arising out of the war continue to affect the work of this Division. Unavoidable normal wastage and the inability to secure replacements has seriously reduced the number of veterinary inspectors on the staff.

The work in the Meat Inspection Section has been exceptionally heavy, due to the large increase in animals slaughtered at abattoirs under Federal inspection. To maintain this service it has been necessary to draw heavily on the field staff, with the result that the volume of work done under the bovine tuberculosis eradication policies has been greatly reduced. It has, however, been possible to commence the initial testing of cattle in new areas in Quebec, Ontario, Manitoba, Saskatchewan and Alberta."

In these very modest terms the newly appointed Veterinary Director General—Dr. M. Barker—introduces this annual report which cloaks, in statistical form, prodigious tasks well done by a staff of veterinarians, sadly depleted and handicapped by war-time exigencies. Under the Tuberculosis-Accredited Herd plan alone over a quarter of a million cattle were tuberculin tested with only 0·14 per cent. reactors, whilst over one million animals were included under the Tuberculosis-Area testing, with 0·9 per cent. reactors. Progress in the control of Bang's disease (Brucellosis) was indicated by the fact that out of 2,736 herds, under supervision, 1,781 were listed as free from this disease. Amongst other contagious and communicable diseases only a few localised outbreaks of hog cholera, mange in cattle and horses and rabies were recorded. Details of the work carried out by the Meat and Canned Foods Section, submitted by Dr. C. Maconochie, are included at the end of the report. Meat and meat products exported showed an increase of nearly 208½ million pounds, approximately 34 per cent. above the total for the previous year, whilst the number of animals slaughtered under inspection was almost 2½ millions in excess. Cattle (9·07 per cent.), sheep (14·15 per cent.) and swine (36·72 per cent.) indicate the per cent. increases, whilst poultry decreased 11·02 per cent. The total number of animals slaughtered under inspection was close on twelve millions.

S. A. E.

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tracheitis, a constant and diagnostic feature seen in this animal following injection of pathogenic members of the pasteurella group. (Magnusson, 1914.)

It is necessary to mention here that bipolar-staining organisms which are non-pathogenic for the rabbit, have been repeatedly isolated by the writer from bovine pneumonic lesions presenting that so-called marbled appearance associated with this form of haemorrhagic septicaemia. It can be seen that the symptoms and lesions mentioned above are not identical with those described by Hall 1937, Turner 1938, Pickering 1939. The nasal haemorrhage was noted by Lamont and Foggie, 1939.

Pasteurellosis in bovines would not appear to be a common condition in this country as the writer is not aware of any other similar outbreak occurring in Southern Ireland.

References

Magnusson, H. (1914.) *Z. InfektKr. Haustiere.* **15.** 61.
Hall, E. B. D. (1937.) *Vet. Rec.* **49.** 1382.
Turner, P. R. (1938.) *Vet. Rec.* **50.** 1010.
Pickering, J. P. (1939.) *Vet. Rec.* **51.** 277.
Lamont, H. G., and Foggie, A. (1939.) *Vet. Rec.* **51.** 979.

QUESTIONS IN PARLIAMENT

Veterinary Education

Colonel Ropner asked the Minister of Agriculture whether the improvement of veterinary education is regarded in any way as a national responsibility; how the Government contribution to such education compares with that for other medical education; and what contribution the Government has made to the success of the Veterinary Educational Trust scheme.

Mr. Hudson: The improvement of veterinary education is certainly regarded by the Government as a matter of national concern. A Committee under the chairmanship of Dr. Loveday, appointed by the Secretary of State for Scotland and myself, has made a number of recommendations for the improvement of veterinary education, and these are now under consideration by the Government and the various bodies concerned. The Government's financial contributions to medical and veterinary education are made on different bases, and it is hardly practicable to make a useful comparison between them; but the grants made to the two veterinary schools in England during the last four years amount to nearly £100,000. The Loveday Committee's recommendations envisage substantially larger grants for the veterinary educational facilities they propose. The Government does not contribute financially to the Veterinary Educational Trust, which is, of course, intended to supplement other resources.

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Foot-and-Mouth Disease

Mr. Turton asked the Minister of Agriculture what was the number of foot-and-mouth disease outbreaks from February 1st, 1944, to February 1st, 1945; how many of these outbreaks occurred in pigs and how many occurred in livestock owned by butchers.

Mr. Hudson: There were 201 outbreaks of foot-and-mouth disease during the 12 months ended February 1st, 1945. Ninety-two of these outbreaks were due to the spread of infection from other animals in this country. In 95 of the remaining 109 outbreaks, the disease first appeared among pigs, and in 23 the animals were owned by butchers.

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Government Policy for Agriculture

Colonel Ropner asked the Minister of Agriculture whether he can yet indicate if it is intended to announce the Government's long-term agricultural policy within the next six months, or whether it is intended that this should await either the end of the war or the result of the General Election.

Mr. Hudson: No, Sir.

VETERINARY EDUCATION

Our present standards of veterinary education in the basic sciences have a sound basis but the average veterinary graduate of to-day shows a sublime inability in the faculty of reasoning and in the use of his hands in the performance of professional tasks. The strength of our medical colleges lies in the fact that they revolve around clinical medicine, but there is no veterinary college in this country that is built around clinical medicine. To remedy the situation, provision should be made for veterinary students to practise the art of veterinary medicine during the latter part of their college training. The clinical staffs in our veterinary colleges should have at least one staff member for every ten students. Further, in selecting students for publicly supported schools the selection should be made on a rural background, personality and the psychological attitude of the prospective student, rather than on scholastic attainment alone.—Jas. Farquharson, President, A.V.M.A., at 25th Annual Illinois Veterinary Conference, October 4th, 1944.

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Weekly Wisdom

By disorderly and hazy writing then we fall into worse things than muddle: we blunt the probity of our minds; we slur over difficulties and cover up ignorances. Content to be bunglers, we lose our respect for truth, and blunt our scientific consciences.—Clifford Allbutt: "Notes on the Composition of Scientific Papers."

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To encourage heavy horse breeding, the Scottish Department of Agriculture are again offering financial assistance to a limited number of breeding societies—direct premium grants of £40 per stallion.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Feb. 21st.—Meeting of the British Society for Animal Production, London School of Hygiene and Tropical Medicine, 10 a.m. (Discussion on "Meat," following a short business meeting).
Feb. 21st.—Meeting of the Section of Comparative Medicine, Royal Society of Medicine, 1, Wimpole Street, W.1, 2.0 for 2.15 p.m.
Feb. 21st.—Annual General Meeting of the Lancashire Division, N.V.M.A., in Liverpool.
Feb. 24th.—Whole-day Conference of Nutrition Society, London School of Hygiene and Tropical Medicine, 11 a.m. Afternoon session, commencing at 2.15, will include papers on "Value of Wheat Offals for Milk Production," by Professor H. D. Kay, and on "Value of Wheat Offals for Pigs and Poultry," by Mr. E. T. Halnan.
Mar. 1st.—Meeting of the Society of Veterinary Practitioners at Chester (Queen's Hotel), 2.30 p.m.
Mar. 3rd.—Meeting of the Nutrition Society (Scottish Group), Royal (Dick) Veterinary College, Edinburgh, 10.30 a.m. (Subject: "Problems of Stock Feeding.")
Mar. 8th.—Annual General Meeting of the South-Eastern Division, N.V.M.A., at Maidstone (Royal Star Hotel), 2.30 p.m.
April 1st.—R.C.V.S. Annual Fees due.
April 11th.—R.C.V.S. Committee Meetings.
April 12th.—R.C.V.S. Committee and Council Meetings.
May 8th.—R.C.V.S. Council Elections—last day for nominations.
May 22nd.—R.C.V.S. Council Election—Voting Papers issued.
May 29th.—R.C.V.S. Council Election—Voting Papers to be returned.
June 5th.—R.C.V.S. Annual General Meeting.
June 6th.—R.C.V.S. Committee and Council Meetings.

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R.C.V.S. Council Election, June, 1945

Since our last publication (issue February 10th) of the list of candidates for election to Council, R.C.V.S., the nominations have been made of Mr. T. Hicks (Sleaford) and Mr. F. Beckett (Blandford).

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PERSONAL

Research Professorship in Animal Health at Aberystwyth

The title of the Chair envisaging, as it does, work of a veterinary character, the professjon will be pleased to learn that a veterinarian, in the person of Mr. Alastair N. Worden, B.A. (Cantab.), B.Sc. (Lond.), M.R.C.V.S., A.R.I.C., has been elected to the Research Professorship in Animal Health recently endowed by Lord Milford at the University College of Wales, Aberystwyth, and will take up his appointment at an early date. Mr. Worden, who is 28, was educated at Queen Elizabeth's School (Barnet), the Royal Veterinary College, London, and St. John's College, Cambridge, and graduated in chemistry and biochemistry as well as in veterinary science. For over two years he was pupil and assistant to Mr. Jack Pickup, M.R.C.V.S., of Barnet. In 1938 he was awarded a three-years Research Studentship in Animal Health, of which the first year was spent in the Division of Nutrition, Lister Institute of Preventive Medicine, the second in the Bacteriological and Biochemical Departments of the Veterinary Laboratory, Weybridge, and the third in the Department of Agriculture, Cambridge, except for a brief period at the Rowett Research Institute, Aberdeen. In 1941 he was appointed to the Section of Biochemistry of the Institute of Animal Pathology, University of Cambridge. His research, much of which has been published in various scientific journals, has dealt mainly with subjects of importance to human and animal nutrition, and with the relationship of nutrition to infectious disease.

In the Deed of Trust establishing the Chair, the subject of animal health is broadly defined as the study of the causes and conditions of animal health and includes animal breeding, animal nutrition and the prevention and control of animal diseases. It is expected that the Professor will devote special attention to the conditions relating to the increase in the efficiency of livestock production more especially in Wales, and in particular to the problems connected with animal nutrition in relation to animal health.

So far as may be possible, his work will be undertaken in conjunction with that carried on by the Welsh Plant Breeding Station at the College.

Lt.-Colonel Keane's Award.—Announcement is made in the list of Army awards, published on Saturday last, for gallant and distinguished services in Burma and on the Eastern Frontier of India, of the conferment of the O.B.E. on Lt.-Colonel J. S. Keane, of the Royal Army Veterinary Corps.

Births.—Day.—On February 4th, 1945, to Evelyn (*née* Ingram), wife of Kenneth S. J. Day, M.R.C.V.S., of Faringdon, Berks, a son—Michael John.

Schofield.—On February 9th, 1945, at Wilpshire, Blackburn, to Elsie K. Schofield, M.R.C.V.S. (*née* Finke), wife of W. D. Schofield, a sister for Gillian.

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R.C.V.S. OBITUARY

Jarvie, T. R., Gateshead-on-Tyne. Graduated May 27th, 1890. Died February 4th, 1945; aged 81 years.

Mr. T. R. Jarvie, M.R.C.V.S.

Mr. Jarvie went to Gateshead in 1893. He was a member of the North of England Veterinary Medical Association for many years. In his earlier years, Mr. Jarvie, who had been in practice up to only a few weeks ago, built up an extensive horse-shoeing business, in addition, and was known to be a good judge of both horses and dogs, having officiated on occasion at various shows in the North of England.

PRINCIPAL DONALD CAMPBELL, M.R.C.V.S.

A Further Tribute

Professor George Dykes, of the Glasgow Veterinary College, writes:—

Many pens will be dipped into many wells of past memories to trace the lines of grace and growth of the professional life and work of Principal Campbell; few will feel at the end of their appreciation that they have done full justice to one who was a giant in our profession. The inspiration which unremittingly flowed from that life, though beyond description as spirit is beyond description, will live on—token and exemplar of a life well spent.

As one privileged to come and go to "Cruachan," I would show another picture to those for whom he laboured. He never entered his home—dwelling of love and happy laughter—no matter how short his absence, without an anxious enquiry for the well-being of all his loved ones and for news of absent friends. The meal over, man and maid gone for the night, he would help clear away so that he could enjoy the greatest pleasure he knew, the greatest happiness he ever sought—wife and weans and other loved ones gathered round that fireside.

Well read in his science; well read in literature, especially of his native land; he loved the "Auld Book," and lived up to its highest teachings.

Once asked, "What would you say had exercised the greatest influence in your professional life?"—"I attended an N.V.M.A. meeting, I heard Mr. John W. McIntosh speaking, and I determined to follow his philosophy. I have never regretted it." How well Principal Campbell succeeded stands token to both. This memory came back as I saw that mentor standing at the graveside of the man he loved. Principal Campbell felt he had incurred a debt, but likewise, and all unconsciously, he too, by his sterling character, by many kindly thoughts and deeds, including some kindly rebuke for wrongdoing, has passed on an eternal debt to many, such as I. We owe so much to the one who taught and the one who learned.

When I last passed through the hall of his home, my eye caught his sword hanging on the wall—emblematic of Captain Donald Campbell; symbol of his loyalty to his King and his country; emblem of his modesty; emblem of his texture and his temper—of a great power which was never used in any unjust cause.

He left his home only once without saying a tender farewell; and we who watched him pass could not realise that that voice was stilled.

"From scenes like these auld Scotia's grandeur springs.
Beloved at home, revered abroad.
Princes and lords are but the breath of kings;
An honest man's the noblest work of God."

Let us thank God for His noble work.

* * * * *

ADDRESSES OF DISEASE-INFECTED PREMISES

Swine Fever.—Smeaton Farm, St. Ann's Chapel, Gunnislake, Cornwall; King's Head Inn, Middle Street, Nafferton, Driffield, Yorks.; Llanungar Farm, Solva, Pembroke; Bickham Farm, St. Budeaux, Plymouth, Devon; Old Mill Yard, Brayton, Selby, Yorks.; Ty-to-Maen, St. Mellons, Cardiff; Springfield Allotments, Bury St. Edmunds; 10, Bedford Road, Barton-in-the-Clay, Beds. (Feb. 6th, 1945); Penwartha Coombe, Bolingey, Perranporth, Cornwall; Oxgang Piggery, Waterside Road, Kirkintilloch, Dunbartonshire (Feb. 7th, 1945); Manor Farm, Abington Pigotts, Cambridge; Royal Hospital for Incurables, West Hill, Putney, London, S.W.15; Muirton Farm, Drainie, Morayshire (Feb. 8th, 1945); Hunters Tryst, Oxgangs Road, Edinburgh, 13; Lower Farm, Ibworth, Hannington, Basingstoke, Hants.; The Ropery, Whitby, Yorks. (Feb. 9th, 1945); "Deanlands," Munday Dean, Great Marlow, Bucks.; 1, Green Lane, Whitby, Yorks.; Burnlee Dairy, Slatford, Edinburgh, 11 (Feb. 10th, 1945); Foulscote Farm, South Moreton, Didcot, Berks.; Bogton Road, Forres, Morayshire; Piggery adjoining Napiers Smallholding, Off Windmill Road, Kirkcaldy, Fife; Higher Tarr, Lydeard St. Lawrence, Taunton, Somerset; Quemerford Gate Farm, Calne, Wilts.; West Park Farm, Epsom, Surrey; Rose Hill Farm, Perranporth, Cornwall; Knutton Farm, Silverdale, Stoke-on-Trent, Staffs.; 26, Mardy Road, Mardy, Ferndale (Rhondda), Glam.; Norwich Road Allotments, Cromer, Norfolk (Feb. 12th, 1945).

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"HEAD OF THE CIVIL SERVICE"

Commenting on the retirement of Sir Richard Hopkins and the appointment of Sir Edward Bridges as Permanent Secretary to the Treasury, *The Times* observes that this title has by now become firmly established in spite of frequently expressed doubts of its constitutional propriety.

"That the service should have at least a titular head is perhaps only a due recognition of its dignity in the commonwealth, although there is bound to be some anomaly in any subjection of officials to an authority other than of the respective Ministerial chiefs under whom they serve. In practice the test must be whether the arrangement can be shown to conduce to high professional standards and good conditions of employment in the service as a whole. It has always been debatable whether the chief permanent official in the Treasury is the person best fitted to exercise final control over staff and employment questions. Though the Treasury has replied to the critics by strengthening itself and other departments on the side of 'organisation and methods,' its predominant interest still is and must be in economy and retrenchment. Experience has added force to the argument that the position of Head of the Civil Service should not belong to the professional adviser of any departmental Minister, but rather to a civil servant associated with the Prime Minister himself, not in his capacity as First Lord of the Treasury, but as supervisor of all departments and first counsellor of the Sovereign, who is the master of all the public services. The official best fulfilling this requirement is the Secretary of the Cabinet; and the accident that temporarily combines this position with that of head of the service might afford a convenient occasion for reconsidering the arguments."

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Veterinary Educational Trust Awards.—It is regretted that, in the schedule of awards reproduced in our last issue, Mr. J. Lochiel McGirr, M.R.C.V.S., a Wellcome Research Fellow, was erroneously listed amongst the holders of the Bloodstock Research Fellowships.

* * * * *

V.M.A.I. REPLY TO DISEASED IMPORTED CATTLE ALLEGATION

The Veterinary Medical Association of Ireland has issued a reply to the recent allegation at a National Farmers' Union meeting in England that 40 per cent. of Irish cattle sent to England are tuberculous. The Association says that 92 per cent. of heifers and bullocks of the type and quality normally sent to Britain from Eire are free from tuberculosis in Eire. Of the remaining 8 per cent. which have the disease, the vast majority are only slightly affected, and only one-half of 1 per cent. of all stores, such as those which are exported, are seriously affected with the disease. "Taking into account what is believed to be the position in regard to bovine tuberculosis in Great Britain," continues the statement, "we are satisfied that, as it is, the importation of Irish cattle in no way affects the general incidence of the disease in that country, and cannot by any means be considered a menace to British livestock interests."

* * * * *

Sir John Boyd Orr, Director of the Rowett Research Institute, Aberdeen since 1914, has intimated his resignation from that post, which carries with it the directorship of the Imperial Bureau of Nutrition and the editorship of *Nutrition Abstracts and Reviews*. Meanwhile, he will continue as Professor of Agriculture in Aberdeen University and head of the North of Scotland College of Agriculture.

LIVESTOCK FERTILITY

"The fertility of farm animals can be increased by raising the number of young born in each litter or by producing heat and conception outside the normal breeding season," states the *British Medical Journal* in a recent annotation, which continues: "In 1940 Parkes and Hammond[1] reported preliminary results of their efforts to use gonadotrophic extracts for this purpose. Injections of horse pituitary extract into ewes during anoestrus brought on oestrus, though the ewes would not accept the ram until given a second injection 15 to 17 days later. Of seven ewes so treated four became pregnant, and seven lambs were the result. The number of ova shed after such treatment was within the normal range. During the breeding season superovulation was induced by injections in the last three to four days of the cycle—that is, in the follicular phase. As many as nine ova were shed by one animal, and up to seven fertilised eggs were recovered. In one instance five embryos were still present half-way through pregnancy. More extended results published later[2] showed that pregnant mares' serum or oestrogen would also cause normal ovulation in anoestrous ewes, but heat did not follow the gonadotrophin injections except in the presence of a regressing corpus luteum. In oestrous animals the presence of an active corpus luteum appeared to suppress both ovulation and heat, but superovulation, with as many as 12 ova, was obtained by giving horse-pituitary gonadotrophin a few days before the corpus luteum was due to regress. In cows and heifers Hammond and Bhattacharya[3] stimulated ovulation in a majority of cases by giving 1,500 to 5,000 i.u. of pregnant-mare-serum gonadotrophin from five days before to three days after manual expression of the corpus luteum from the ovary. As many as 30 ovulations in a single animal were obtained, but in a small series that were allowed to go to term the number of young born was within normal limits, though twins and triplets were abnormally frequent. Folley and Malpress[4] find that the threshold dose of serum gonadotrophin necessary to stimulate the ovary is 1,000 to 2,000 i.u., while maximal responses are evoked by injections of 3,000 to 4,000 i.u. Ovulation was produced only during the follicular phase, though horse-pituitary gonadotrophin was effective in this respect at all stages of the cycle.

"In America a group of workers in the University of Wisconsin have carried out similar researches on cows and sheep. Subcutaneous injections of unfractionated or follicle-stimulating extracts of sheep pituitary, followed by intravenous injection of a luteinising extract from the same source, brought on ovulation in calves and cows. The eggs shed in this fashion were fertilisable, but only in an abnormally small percentage of cases. In the cows such injection procedures during the breeding season only increased fecundation when given in the second half of the cycle, and there was evidence of early foetal death in such hyperfecundation. In sheep, Warwick and Casida[5] brought about superovulation by a similar series of injections, though only when given in the follicular phase of the cycle. When the injections were made in the luteal phase of the cycle or during anoestrus, ovulation was consistently produced but oestrus was not, while variations were noted in attempts to fertilise the shed eggs by artificial insemination.[6] Eggs shed during the luteal and anoestrous phases were all unfertilised, while of 24 ewes treated during the follicular phase seven had no fertilised eggs. The total number of eggs recovered was 357, and in the 17 animals in which fertilisation took place there were 153 fertilised eggs.[7] Failure to maintain hyperfecundation was also confirmed by subsequent mating or artificial insemination of ewes in which superovulation was produced by the usual injections during the follicular phase. The average number of embryos per ewe was 9·2 at two to five days, 3·4 at 14 to 27 days, and 0·8 at 30 to 37 days.[8]

"Present results show that it may be possible to work out methods for inducing out-of-season breeding, but that hyperfecundation, if produced, is not maintained, and that the number of young can be increased only by increasing the incidence of twin and triplet births. The value of these investigations is, however, not confined to their practical outcome on the farm, for they also help in the elucidation of normal ovulatory mechanisms; this must be completed before we can hope for any general success in the treatment of human infertility."

(1) *Proc. roy. Soc. Med.* (1940.) **33**. 483.
(2) *J. agric. Sci.* (1942.) **32**. 308.
(3) *Ibid.* (1944.) **34**. 1.
(4) *Proc. roy. Soc.* B. (1944.) **132**. 164.
(5) *Amer. J. vet. Res.* (1943.) **4**. 76.
(6) *Endocrinology.* (1943.) **33**. 169.
(7) *J. Animal Sci.* (1944.) **3**. 12.
(8) *Ibid.* p. 22.

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The Shorthorn Society is asking the National Cattle Breeders Association to form a committee of dairy breed society representatives to consult the Milk Board on questions affecting milk recording in pedigree herds.

FUTURE OF THE HEAVY HORSE

Speaking at the annual meeting of the North-East England District of the Clydesdale Horse Society, Mr. Douglas M. Murray, of Seaham Harbour, expressed his confidence in the future of the heavy horse-breeding industry. That confidence was based on general factors, he said, two of them being the continued need for horses in agricultural life, notwithstanding the present enthusiasm in some quarters for mechanical power, and the tremendous losses in horses in most European countries.

Mr. Murray referred to the registration of pedigrees in the Stud Book, and strongly advised breeders to maintain and increase their present efforts and really be in a position to meet future requirements.

* * * * *

SCHEME FOR THE CONTROL OF DISEASES OF DAIRY CATTLE

STATEMENT SHOWING THE NUMBER OF UNDERTAKINGS NOTIFIED TO THE MINISTRY OF AGRICULTURE DURING THE MONTH ENDED JANUARY 31ST, 1945

County	Undertakings Notified		Total Undertakings		
	During Month	Previously	Number	Number of Cattle	
				Cows	Heifers
ENGLAND					
Bedford	—	42	42	994	552
Berks	1	104	105	3,534	2,215
Bucks	2	97	99	3,271	1,869
Cambridge	—	13	13	331	203
Chester	3	411	414	13,525	4,614
Cornwall	—	4	4	72	75
Cumberland	—	65	65	1,618	1,411
Derby	5	341	346	9,870	5,581
Devon	8	284	292	4,348	2,614
Dorset	—	70	70	2,160	1,145
Durham	4	283	287	6,320	2,2 2
Essex	1	257	258	9,180	5,393
Gloucester	1	103	104	3,085	1,806
Hampshire	3	402	405	11,222	7,412
Hereford	—	23	23	299	237
Hertford	—	78	78	2,349	1,439
Hunts	—	13	13	475	302
Isle of Ely	—	3	3	83	75
Isle of Wight	—	14	14	252	127
Kent	1	162	163	4,063	2,373
Lancs	2	202	204	5,802	1,843
Leics	4	103	107	2,720	1,916
Lincs (Holland)	—	3	3	25	11
Lincs (Kesteven)	—	25	25	337	149
Lincs (Lindsey)	—	107	107	2,046	1,171
Middlesex	—	16	16	641	307
Norfolk	1	197	198	5,976	4,112
Northants	2	86	88	2,444	1,872
Northumberland	—	69	69	2,349	1,126
Notts	3	165	168	3,731	2,236
Oxford	1	43	44	1,280	1,144
Rutland	1	8	9	172	124
Salop	1	278	279	8,506	4,056
Soke of Peterborough	—	1	1	37	31
Somerset	2	250	252	6,615	3,110
Staffs	—	220	220	6,460	3,481
Suffolk, E.	—	93	93	2,192	1,628
Suffolk, W.	1	51	52	1,067	634
Surrey	2	111	113	3,222	1,468
Sussex, E.	5	178	183	4,649	2,649
Sussex, W.	—	120	120	3,314	1,980
Warwick	2	139	141	3,480	2,141
Westmorland	2	13	15	400	474
Wilts	1	96	97	3,928	1,847
Worcester	2	158	160	3,356	1,545
Yorks, E.R.	—	108	108	1,668	963
Yorks, N.R.	—	117	117	2,347	1,443
Yorks, W.R.	3	268	271	6,632	2,581
WALES					
Anglesey	—	48	48	836	611
Brecon	—	9	9	199	108
Caernarvon	—	114	114	1,780	974
Cardigan	—	33	33	611	412
Carmarthen	3	244	247	4,410	2,269
Denbigh	—	61	61	1,361	655
Flint	—	119	119	2,619	1,158
Glamorgan	2	105	107	1,780	703
Merioneth	—	10	10	125	68
Monmouth	1	54	55	1,308	755
Montgomery	—	15	15	296	222
Pembroke	1	84	85	1,647	1,195
Radnor	—	—	—	—	—
TOTALS	71	6,890	6,961	179,518	96,817

Notes.—(1) Operative periods of undertakings: 1 year, 1,310; 2 years, 610; 3 years, 5,041. (2) Undertakings renewed for a further period: 1 year, 819; 2 years, 152; 3 years, 141. (3) Undertakings not renewed at end of operative period, 496. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings and do not include undertakings renewed for a further period.

Undertakings which have been cancelled or not renewed are not included in the figures for previous notifications.

County	Undertakings Notified		Total Undertakings		
	During Month	Previously	Number	Number of Cattle	
				Cows	Heifers
SCOTLAND					
Aberdeen	—	19	19	782	219
Angus	—	21	21	838	395
Argyll	—	6	6	113	115
Ayr	—	35	35	1,100	841
Banff	—	4	4	121	42
Berwick	—	2	2	53	22
Bute	—	—	—	—	—
Caithness	—	—	—	—	—
Clackmannan	—	7	7	282	257
Dumfries	1	12	13	707	610
Dumbarton	—	3	3	105	86
East Lothian	—	3	3	145	88
Fife	1	36	37	1,384	629
Inverness	—	8	8	324	191
Kincardine	—	4	4	195	126
Kinross	—	2	2	29	17
Kirkcudbright	—	16	16	954	700
Lanark	1	19	20	719	512
Midlothian	—	1	1	44	69
Moray	—	—	—	—	—
Nairn	—	1	1	14	—
Orkney	—	—	—	—	—
Peebles	—	2	2	28	16
Perth	—	32	32	720	427
Renfrew	—	7	7	277	201
Ross-shire	—	3	3	89	65
Roxburgh	—	—	—	—	—
Selkirk	—	—	—	—	—
Stirling	3	26	29	931	781
Sutherland	1	4	5	105	72
West Lothian	—	1	1	23	18
Wigtown	1	25	26	1,736	998
Zetland	—	—	—	—	—
TOTALS ..	8	299	307	11,818	7,497

Notes.—(1) Duration of undertakings: 1 year, 39; 2 years, 20; 3 years, 248. (2) Undertakings renewed for a further period (included in column 2 of statement): 1 year, 34; 2 years, 5; 3 years, 6. (3) Undertakings expired and not renewed (not included in column 2 of statement), 84. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings.

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AGRICULTURAL HORSES IN CANADA

The comparatively small number of tractors and the large number of horses used on the Canadian Prairies will no doubt surprise many people who are inclined to talk about the highly mechanised farms of the West. According to official figures issued by the Dominion Bureau of Statistics, there are 723,715 farms in the whole of Canada, of which 296,441 are in the three Prairie Provinces. On these farms there was a total of 158,844 tractors, of which 112,063 were in the Prairie Provinces. This means that only 21·60 per cent. of the farms in Canada have tractors on them, and only 37·60 per cent. of the agricultural provinces used tractors, while of course it is well known that many farms have tractors and also use horses. The latest figures for the three agricultural Prairie Provinces indicate that Alberta has 645,378 horses, Saskatchewan 803,893 and Manitoba 301,702: a total of 1,750,973 horses in these three areas alone. To maintain this large number of horses, great acreages must still be sown with oats and hay to provide the necessary horse feed.—*National Horse Association News Sheet.*

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H.M. STATIONERY OFFICE PUBLICATIONS

The undermentioned have been published recently. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office.

	Price net s. d.	*Post free* s. d.
COMMAND PAPERS (Session 1944-45):		
[6590] Food and Agriculture. Documents relating to the Food and Agriculture Organisation of the United Nations. May 4th—December 14th, 1944. (Miscellaneous No. 4, 1945.)	0 9	0 11
HEALTH, DEPARTMENT OF, FOR SCOTLAND: The Freezing Point (Hortvet) Test of Milk. Report of a Sub-committee (Chairman: Sir Alexander MacGregor, O.B.E., M.D., LL.D., J.P.) of the Scientific Advisory Committee. August 9th, 1943. (49-279)	0 4	0 5
HOUSE OF COMMONS BILLS: 16. Colonial Development and Welfare ...	0 1	0 2

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal views of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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FOOT-AND-MOUTH DISEASE

Sir,—In view of the present widespread discussion and anxiety as to the source of infection in recent outbreaks of foot-and-mouth disease, especially amongst pigs, the following may be of interest.

On meeting a neighbour home on leave from the Western Front recently, I took the opportunity to indulge in a little rabies "anti-dog-smuggling" propaganda. Conversation then turned to other animal topics as referred to the continent and I happened to remark quite casually (and half humorously) that "I wondered how much foot-and-mouth virus the leave men were tramping back here," and what was the present incidence of that disease in the countries in which our armies are now fighting. I was then told of this episode: Some weeks ago, in Holland, the truck in which the narrator works was left behind the unit to which it was attached; during the journey to regain the unit the driver parked the truck in a field for the night and the men camped there. They noticed that there were cattle in the field and also that there was a peculiar and unpleasant odour not usually associated with cattle. In the morning an attendant arrived to milk the cows and the men naturally attempted to "scrounge" some milk for breakfast. They were told that the cattle were in isolation as they were suffering from foot-and-mouth disease and the milk was therefore unusable; it was then seen that the beasts were obviously affected, most of them salivating profusely and some with sloughing hooves.

In this case the incident occurred some weeks before the man concerned came on leave, but it might equally have occurred a day or so before that leave.

I am told that the journey from unit to home (anyway in Southern England) takes little over 36 hours, and presumably opportunities for personal disinfection or change of clothing and equipment are not numerous. Add to this the fact that many of these men were enthusiastic members of pig clubs before joining the Services and that while on leave they usually visit the piggeries and often take a hand in the work. I feel that one has, to say the least, a suggestive line of thought in those outbreaks where it seems so difficult to incriminate the swill.

Yours faithfully,

JOAN O. JOSHUA.

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THE VETERINARY SURGEON'S TITLE

Sir,—May I say how heartily I agree with Mr. Holliday-Pott's plea for the veterinary surgeon to be given the courtesy title of doctor in common with the diploma'd medical practitioner.

Amongst my clients are a large number of immigrants and visitors from various countries, including the U.S.A. They all give me the title of doctor and are surprised when informed that in England the veterinary surgeon is always called "Mr." One client went so far as to enquire how it was possible to distinguish between the qualified and the unqualified and how the title "Mr." differentiated between a veterinary surgeon, a plumber or a dustman.

Yours faithfully,

5, Bank Parade, LEONARD R. GEFFEN.
West Kensington, W.14.
February 3rd, 1945.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Parasitic Mange*	Sheep Scab	Swine Fever
Total 1st to 15th January 1945 ...	9	8	1	7	46
Corresponding period in—					
1944 ...	12	1	1	22	21
1943 ...	14	7	—	9	13
1942 ...	12	—	2	31	14

NOTE.—The figures for the current year are approximate only.
* Excluding outbreaks in Army Horses.

Tuberculosis Order of 1938

The number of animals slaughtered by the Ministry of Agriculture and Fisheries under the Tuberculosis Order of 1938 during the period October 1st to December 31st, 1944, was 2,364.